RAPID DETERMINATION OF INDONESIAN BLACK TEA QUALITY SCORE FOR APPEARANCE, LIQUOR AND INFUSION USING NEAR INFRARED SPECTROSCOPY FOLLOWED BY PARTIAL LEAST SQUARE REGRESSION

Andreas T. E. Prasetya[1], Nur A. Wibowo [1], Ferdy S. Rondonuwu [1,2*]

[1]Faculty of Science and Mathematics, Universitas Kristen Satya Wacana, Diponegoro 52-60, Salatiga 50711, Indonesia

[2]Research Center for Near Infrared Applications, Universitas Kristen Satya Wacana, Diponegoro 52-60, Salatiga 50711, Indonesia

*Corresponding author: ferdy@staff.uksw.edu

ABSTRACT

Generally, the quality assessment of black tea from camellia sinensis is determined by three important aspects including appearance, liquor and infusion. Traditionally, the assessment is carried out by highly trained people using organoleptic technique. However, this technique requires good physical and psychological health condition of the trained people as it relies on sensitivity of their sensory. In addition, the assessment usually is done by three to five people to avoid unfairness and inconsistency in judgment. In this paper, we report a new technique for tea quality assessment using near-infrared spectroscopy followed by partial-least-square (PLS) regression. The technique was developed by collecting 69 grade FANN black tea samples of CTC type from 10 estates in Java and Sumatera. The samples were randomly divided by two groups consisting of 50 and 19 samples. The first group was used for developing a training set while the latter for validation set. Near-infrared spectrum is in the range of 4.000-7.500 cm^{-1} with interval 4 cm^{-1} were collected from the 69 samples without sample modification or pretreatment. Then, the second derivative spectrum used to build PLS model and validation procedure. The training set utilizing results obtained from organoleptic assessment of the same sample to calculate predictor's coefficient along energy-axis. Validation set then examines the prediction accuracy of the near-infrared and PLS model. The results show that near-infrared and PLS technique successfully build regression model based on training set samples and predict properly the score obtained by organoleptic assessment of three parameters including appearance, liquor and infusion using sample form the validation set. We conclude that the above nondestructive measurement by near-infrared spectroscopy followed by PLS regression calculation successfully assess black tea quality of FANN and provides opportunity for rapid determination of tea quality from large number of tea samples on market site.

Keyword: organoleptic, spectroscopy, pls, black tea